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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,231	04/14/2006	Atsushi Yabe	4700.P0327US	7188
23474 7590 07/17/2009 FLYNN THIEL BOUTELL & TANIS, P.C. 2026 RAMBLING ROAD KALAMAZOO, MI 49008-1631				
EXAMINER BAREFORD, KATHERINE A				
ART UNIT		PAPER NUMBER		
1792				
MAIL DATE		DELIVERY MODE		
07/17/2009		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/576,231

**Applicant(s)**

YABE ET AL.

**Examiner**

Katherine A. Bareford

**Art Unit**

1792

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 April 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3 and 5-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- Paper No(s)/Mail Date \_\_\_\_\_

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 20, 2009 has been entered.

The amendment filed with the RCE submission of February 20, 2009 has been received and entered. With the entry of the amendment, claim 4 is canceled, and claims 1-3, 5 and new claims 6-7 are pending for examination.

The declaration filed April 24, 2009 has also been received and considered.

### ***Specification***

2. The substitute specification filed August 11, 2008 has been approved by the Examiner.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-3 and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amelio et al (US 4655833) in view of Verbunt (US 2004/0152303).

Amelio teaches an electroless copper plating solution. Column 2, lines 5-15. The plating solution contains a water-soluble nitrogen containing polymer. Column 2, lines 5-15 and 40-45. Amelio further teaches that electroless copper solutions will contain a reducing agent, giving examples of common reducing agents, but the solution is not limited to these. Column 3, lines 15-40 and claim 1, column 4, lines 55-60.

Claims 2, 6: the water soluble nitrogen containing polymer can be a polyacrylamide. Column 2, lines 5-15 and 40-45.

Claim 5: a copper plating method to deposit copper on a substrate is provided using the electroless copper plating solution with the water soluble nitrogen containing polymer. Column 4, lines 35-50.

Amelio teaches all the features of these claims, except (1) the reducing agent made from glyoxylic acid and phosphinic acid (claim 1, 6) and (2) the precise molecular weight, and Mw over Mn ratio (claim 3). However, Amelio does teach that the water soluble nitrogen containing polymer used can be, for example, Reten 210, Reten 220 or Reten 300 (column 2, lines 40-68) and that such polymers have a relatively high molecular weight of about 50,000-1,000,000 or more (column 3, lines 1-5).

Verbunt teaches that when providing electroless copper plating solutions, it is well known to provide that the reducing agent can be made up of a variety of reducing agents and their mixtures, including using the combination of glyoxylic acid and hypophosphite. Paragraph [0026]. Verbunt further teaches that the source of hypophosphite can be hypophosphorous acid (which the Examiner takes Official Notice is another name for phosphinic acid). Paragraph [0026]. As a result, Verbunt would include combinations of glyoxylic acid and hypophosphorous acid as the reducing agent.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Amelio to provide that the reducing agent is made up of

a combination of glyoxylic acid and hypophosphorous acid (phosphinic acid) as suggested by Verbunt with an expectation of desirable plating results, because Amelio teaches to use a copper electroless plating system with a reducing agent, and Verbunt teaches that a desirable reducing agent system for a copper electroless plating solution would be a combination of glyoxylic acid and hypophosphorous acid. It further would have been obvious to modify Amelio in view of Verbunt to use a water soluble nitrogen containing polymer with a molecular weight above 100,000, because Amelio teaches a range of 50,000 -1,000,000 or more and In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). As to the ratio of Mw over Mn, it is the Examiner's position that for the purposes of consistency and reproducibility it would have been obvious to use polymers of the same molecular weight, which would provide that the molecular weight and the number average molecular weight would be the same number, and therefore provide that Mw/Mn would be one, within the claimed range.

6. Claims 1-3 and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amelio et al (US 4655833) in view of Verbunt (US 2004/0152303), Kondo et al (US 4834796) and Yoshida et al (US 2002/0011176).

Amelio teaches an electroless copper plating solution. Column 2, lines 5-15. The plating solution contains a water-soluble nitrogen containing polymer. Column 2, lines

5-15 and 40-45. Amelio further teaches that electroless copper solutions will contain a reducing agent, giving examples of common reducing agents, but the solution is not limited to these. Column 3, lines 15-40 and claim 1, column 4, lines 55-60.

Claims 2, 6: the water soluble nitrogen containing polymer can be a polyacrylamide. Column 2, lines 5-15 and 40-45.

Claim 5: a copper plating method to deposit copper on a substrate is provided using the electroless copper plating solution with the water soluble nitrogen containing polymer. Column 4, lines 35-50.

Amelio teaches all the features of these claims, except (1) the reducing agent made from glyoxylic acid and phosphinic acid (claim 1, 6) and (2) the precise molecular weight, and Mw over Mn ratio (claim 3). However, Amelio does teach that the water soluble nitrogen containing polymer used can be, for example, Reten 210, Reten 220 or Reten 300 (column 2, lines 40-68) and that such polymers have a relatively high molecular weight of about 50,000-1,000,000 or more (column 3, lines 1-5).

Verbunt teaches that when providing electroless copper plating solutions, it is well known to provide that the reducing agent can be made up of a variety of reducing agents and their mixtures, including using the combination of glyoxylic acid and hypophosphite. Paragraph [0026]. Verbunt further teaches that the source of hypophosphite can be hypophosphorous acid (which the Examiner takes Official Notice is another name for phosphinic acid). Paragraph [0026]. As a result, Verbunt would

include combinations of glyoxylic acid and hypophosphorous acid as the reducing agent.

Kondo teaches that when providing electroless copper plating solutions, it is known that hypophosphite can be provided with a formalin (a solution of formaldehyde) reducing agent, and that this allows (1) a reduction in the amount of formalin used, and (2) an acceleration of plating reaction with used with TEA containing baths. See column 13, line 25 through column 14, line 10 and Figure 9.

Yoshida teaches that glyoxylic acid is a known replacement for formalin (a solution of formaldehyde) as a reducing agent in electroless copper plating, where glyoxylic acid has a structure similar to that of formalin and is believed to have an oxidation reaction mechanism similar to formalin, but that glyoxylic acid plating proceeds more slowly than that of formalin. See paragraphs [0005] – [0007].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Amelio to provide that the reducing agent is made up of a combination of glyoxylic acid and hypophosphorous acid (phosphinic acid) as suggested by Verbunt, Kondo and Yoshida with an expectation of desirable accelerated plating results, because Amelio teaches to use a copper electroless plating system with a reducing agent, and Verbunt teaches that a desirable reducing agent system for a copper electroless plating solution would be a combination of glyoxylic acid and hypophosphorous acid, especially noting to use glyoxylic acid (paragraph [0026]); with Kondo suggesting to add hypophosphite (or hypophosphorous acid as a described



equivalent by Verbant) to formalin containing copper electroless plating solutions to remove undesired material and accelerate the bath if TEA also used, and Yoshida shows that glyoxylic acid would be expected to act in the same fashion as formalin only more slowly, thus suggesting that glyoxylic acid would also be accelerated by hypophosphite as described by Kondo and be desirably accelerated due its slow reaction. It further would have been obvious to modify Amelio in view of Verbunt, Kondo and Yoshida to use a water soluble nitrogen containing polymer with a molecular weight above 100,000, because Amelio teaches a range of 50,000 -1,000,000 or more and In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). As to the ratio of Mw over Mn, it is the Examiner's position that for the purposes of consistency and reproducibility it would have been obvious to use polymers of the same molecular weight, which would provide that the molecular weight and the number average molecular weight would be the same number, and therefore provide that Mw/Mn would be one, within the claimed range.

7. Claims 1-2 and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shipley, Jr. et al (US 3329512) in view of Verbunt (US 2004/0152303), Kondo et al (US 4834796) and Yoshida et al (US 2002/0011176).

Shipley teaches an electroless copper plating solution. Column 1, lines 10-15. The plating solution contains a water-soluble nitrogen containing polymer. Column 2,

lines 15-25 and column 2, line 65 through column 3, line 10 (polyvinylpyrrolidone, polyacrylimides, for example) and column 5, lines 15-50 (examples (3), (4), (9), (10) and (11)). Shipley further teaches that electroless copper solutions will contain a reducing agent of formaldehyde. Column 2, lines 15-20.

Claims 2, 6: the water soluble nitrogen containing polymer can be a polyacrylamide. Column 2, line 65 through column 3, line 2 and column 5, lines 40-45.

Claim 5: a copper plating method to deposit copper on a substrate is provided using the electroless copper plating solution with the water soluble nitrogen containing polymer. See claim 20.

Shipley teaches all the features of these claims, except the reducing agent made from glyoxylic acid and phosphinic acid (claim 1, 6).

Verbunt teaches that when providing electroless copper plating solutions, it is well known to provide that the reducing agent can be made up of a variety of reducing agents and their mixtures, including using the combination of glyoxylic acid and hypophosphite. Paragraph [0026]. Verbunt further teaches that the source of hypophosphite can be hypophosphorous acid (which the Examiner takes Official Notice is another name for phosphinic acid). Paragraph [0026]. As a result, Verbunt would include combinations of glyoxylic acid and hypophosphorous acid as the reducing agent.

Kondo teaches that when providing electroless copper plating solutions, it is known that hypophosphite can be provided with a formalin (a solution of

formaldehyde) reducing agent, and that this allows (1) a reduction in the amount of formalin used, and (2) an acceleration of plating reaction with used with TEA containing baths. See column 13, line 25 through column 14, line 10 and Figure 9.

Yoshida teaches that glyoxylic acid is a known replacement for formalin (a solution of formaldehyde) as a reducing agent in electroless copper plating, where glyoxylic acid has a structure similar to that of formalin and is believed to have an oxidation reaction mechanism similar to formalin, but that glyoxylic acid plating proceeds more slowly than that of formalin. See paragraphs [0005]–[0007].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Shipley to provide that the reducing agent is made up of a combination of glyoxylic acid and hypophosphorous acid (phosphinic acid) as suggested by Verbunt, Kondo and Yoshida with an expectation of desirable accelerated and safer plating results, because Shipley teaches to use a copper electroless plating system with a reducing agent of formaldehyde, and Verbunt teaches that a desirable reducing agent system for a copper electroless plating solution would be a combination of glyoxylic acid and hypophosphorous acid; especially noting to use glyoxylic acid (paragraph [0026]), with Kondo suggesting to add hypophosphite (or hypophosphorous acid as a described equivalent by Verbant) to formalin (formaldehyde) containing copper electroless plating solutions to remove undesired material and accelerate the bath if TEA also used, and Yoshida shows that glyoxylic acid would be expected to act in the same fashion as formalin only more slowly and

providing a desirable and safer replacement for formaldehyde, thus suggesting that glyoxylic acid would also be accelerated by hypophosphite as described by Kondo and be desirably accelerated due its slow reaction.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shipley in view of Verbunt, Kondo and Yoshida as applied to claims 1-2 and 5-6 above, and further evidenced by Amelio et al (US 4655833).

Shipley in view of Verbunt, Kondo and Yoshida teaches all the features of these claims except the molecular weight and weight ratio. Shipley does teach that molecular weight of the polymers is not critical and that very high molecular weights can be used. Column 3, lines 1-5. Further, Shipley teaches that RETEN 210 can be used as the polymer (column 5, lines 40-45).

However, Amelio does teach that the water soluble nitrogen containing polymer used can be, for example, Reten 210, Reten 220 or Reten 300 (column 2, lines 40-68) and that such polymers have a relatively high molecular weight of about 50,000-1,000,000 or more (column 3, lines 1-5).

Therefore, it further would have been obvious to have Shipley in view of Verbunt, Kondo and Yoshida use a water soluble nitrogen containing polymer with a molecular weight above 100,000, because Amelio evidences that the RETEN 210 of Shipley would have a molecular weight in a range of 50,000 -1,000,000 or more and In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior

art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). As to the ratio of Mw over Mn, it is the Examiner's position that for the purposes of consistency and reproducibility it would have been obvious to use polymers of the same molecular weight, which would provide that the molecular weight and the number average molecular weight would be the same number, and therefore provide that Mw/Mn would be one, within the claimed range.

9. Claims 1-3, 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japan 03-287779 (hereinafter '779) in view of Verbunt (US 2004/0152303).

'779 teaches an electroless copper plating solution. Abstract. The plating solution contains a water-soluble nitrogen containing polymer. Abstract (polyethyleneimine would be water soluble as indicated by claim 2). '779 further teaches the electroless copper solutions will contain a reducing agent, giving an example of hydrazine, but the solution is not limited to these. Abstract.

Claim 2, 7: the water soluble nitrogen containing polymer can be a polyethyleneimine. Abstract.

'779 teaches all the features of these claims, except (1) the reducing agent made from glyoxylic acid and phosphinic acid (claim 1, 7), (2) the precise molecular weight, and Mw over Mn ratio (claim 3) and (3) the actual plating (claim 5). However, '779 does teach that the water soluble nitrogen containing polymer (polyethyleneimine) used have a molecular weight of several hundred to several hundred thousand. Abstract.

Verbunt teaches that when providing electroless copper plating solutions, it is well known to provide that the reducing agent can be made up of a variety of reducing agents and their mixtures, including using the combination of glyoxylic acid and hypophosphite. Paragraph [0026]. Verbunt further teaches that the source of hypophosphite can be hypophosphorous acid (which the Examiner takes Official Notice is another name for phosphinic acid). Paragraph [0026]. As a result, Verbunt would include combinations of glyoxylic acid and hypophosphorous acid as the reducing agent.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify '779 to provide that the reducing agent is made up of a combination of glyoxylic acid and hypophosphorous acid (phosphinic acid) as suggested by Verbunt with an expectation of desirable plating results, because '779 teaches to use a copper electroless plating system with a reducing agent, and Verbunt teaches that a desirable reducing agent system for a copper electroless plating solution would be a combination of glyoxylic acid and hypophosphorous acid. It would further have been obvious to modify '779 in view of Verbunt to use a water soluble nitrogen containing polymer with a molecular weight above 100,000, because '779 teaches a range of several hundred to several hundred thousand and In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). As to the ratio of Mw over Mn, it is the Examiner's position that for the purposes of

consistency and reproducibility it would have been obvious to use polymers of the same molecular weight, which would provide that the molecular weight and the number average molecular weight would be the same number, and therefore provide that  $M_w/M_n$  would be one, within the claimed range. As to the plating with the provided copper plating bath, it is the Examiner's position that it would have been obvious to use an electroless copper plating bath to actually plate copper, as that is the purpose that the bath is provided for.

### *Double Patenting*

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claims 1-3 and 5-6 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 5 and 6 of copending Application No. 10/576,230 in view of Amelio et al (US 4655833). The claims of 10/576,230 teach an electroless plating method (and corresponding solution as used in the method) where an electroless copper plating solution is provided with glyoxylic acid and hypophosphorous acid (phosphinic acid) used as the reducing agents (claims 5 and 6). 10/576,230 does not teach to provide a water soluble nitrogen containing polymer in the solution or its features, however, Amelio provides a suggested teaching of using such a polymer in the copper plating solution as Amelio teaches an electroless copper plating solution, where the plating solution contains a water-soluble nitrogen containing polymer, that can be a polyacrylamide. Column 2, lines 5-15 and 40-45. As to the precise molecular weight, and Mw over Mn ratio (claim 3), Amelio does teach that the water soluble nitrogen containing polymer used can be, for example, Reten 210, Reten 220 or Reten 300 (column 2, lines 40-68) and that such polymers have a relatively high molecular weight of about 50,000-1,000,000 or more (column 3, lines 1-5). It would have been obvious to modify 10/576,230 to provide the nitrogen containing polymer in the solution as described by Amelio to provide the beneficial increased plating rates described by Amelio (column 2, lines 15-25). It further would have been obvious to modify 10/576,230 in view of Amelio to use a water soluble nitrogen containing polymer with a molecular weight above 100,000, because Amelio teaches a range of 50,000 -1,000,000 or more and In the case where the claimed ranges "overlap or lie



inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). As to the ratio of Mw over Mn, it is the Examiner's position that for the purposes of consistency and reproducibility it would have been obvious to use polymers of the same molecular weight, which would provide that the molecular weight and the number average molecular weight would be the same number, and therefore provide that Mw/Mn would be one, within the claimed range.

This is a provisional obviousness-type double patenting rejection.

12. Claims 1-3, 5 and 7 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 5 and 6 of copending Application No. 10/576,230 in view of Japan 03-287779 (hereinafter '779). The claims of 10/576,230 teach an electroless plating method (and corresponding solution as used in the method) where an electroless copper plating solution is provided with glyoxylic acid and hypophosphorous acid (phosphinic acid) used as the reducing agents (claims 5 and 6). 10/576,230 does not teach to provide a water soluble nitrogen containing polymer in the solution or its features, however, '779 provides a suggested teaching of using such a polymer in the copper plating solution as '779 teaches an electroless copper plating solution that contains a water-soluble nitrogen containing polymer that can be a polyethyleneimine. Abstract. it would further have been obvious to modify 10/576,230 to use a water soluble nitrogen containing polymer as suggested

by '779 to provide a desirable solution as described by '779. As to the precise molecular weight and Mw over Mn ratio (claim 3), it would further have been obvious to modify 10/576,230 in view of '779 to use a water soluble nitrogen containing polymer with a molecular weight above 100,000 as suggested by '779, because '779 teaches a range of several hundred to several hundred thousand and In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). As to the ratio of Mw over Mn, it is the Examiner's position that for the purposes of consistency and reproducibility it would have been obvious to use polymers of the same molecular weight, which would provide that the molecular weight and the number average molecular weight would be the same number, and therefore provide that Mw/Mn would be one, within the claimed range. As to the plating with the provided copper plating bath, it is the Examiner's position that it would have been obvious to use an electroless copper plating bath to actually plate copper, as that is the purpose that the bath is provided for.

This is a provisional obviousness-type double patenting rejection.

13. Claims 1-2 and 5-7 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 of copending Application No. 12/075,745. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of 12/075,745 teach an

electroless plating method (and corresponding solution as used in the method) where an electroless copper plating solution is provided with glyoxylic acid and phosphinic acid used as the reducing agents (claims 1-2 of '745), and the solution also contains a water soluble nitrogen-containing polymer, that can be polyacrylamide or polyethyleneimine (claims 1, 3 of '745).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

14. The PGPub for 10/576,230 is US 2007/0071904. The PGPub for 12/075,745 is US 2008/0224313.

### *Response to Arguments*

15. Applicant's arguments filed February 20, 2009 and the disclosure filed April 24, 2009 have been fully considered but they are not persuasive.

Applicant has argued that the Examples in the specification and the disclosure of April 24, 2009 establish the patentability of the claimed invention. The Examiner has reviewed the Examples and the Disclosure, however, the rejection is maintained. The showing by applicant is not commensurate in scope with what is claimed (as discussed in MPEP 716.02(d)). While the disclosure of April 24, 2009 does indicate that other nitrogen-containing polymers can be used successfully in the process of the invention (example 7) and that the process can be used successfully with a substrate with a layer

of ruthenium without the silane coupling treatment (example 8), the following problems remain: (1) the present claims do not require specific amounts of materials of the polymer, the glyoxylic acid and the phosphinic acid. However, applicant's own specification indicates that the benefits of the invention will not occur if the concentration of the polymer is not "0.0001 to 5 g/L" (see paragraph [0012] of the specification), the concentration of glyoxylic acid is not "0.005 to 0.5 mol/L" (see paragraph [0015] of the specification), and the concentration of phosphinic acid is not "0.001 to 0.5 mol/L" (see paragraph [0016] of the specification). (2) As to the use of polyethyleneimine (as in claim 7), the rejection using '779 provides the use of hydrazine with polyethyleneimine containing copper electroless plating solutions and Verbunt indicates that glyoxylic acid/phosphinic acid (hypophosphorous acid) can replace hydrazine with an expectation of similar results (paragraph [0026]). Applicant has made no showing that the process using the glyoxylic acid/phosphinic acid has unexpectedly better results than that using hydrazine, as no comparison is made with hydrazine. (3) As to the use of polyacrylimide (as in claim 6), the rejection using Amelio in view of Verbunt provides that Amelio suggests using polyacrylimide in a copper electroless plating solution with various reducing agents, and Verbunt indicates that glyoxylic acid/phosphinic acid (hypophosphorous acid) can replace such reducing agents with an expectation of similar results (paragraph [0026]). Applicant has indicated in Example 4 that while glyoxylic acid alone results in little islands and portions without deposition, that this is still a successful plating that reads on the

teaching of the present invention, and so applicant has not indicated why uniform coating (as in Example 1) would be unexpectedly better. Furthermore, if it is unexpectedly better to provide uniform coating, the Examiner notes that the rejection of Amelio in view of Verbunt, Kondo and Yoshida provides that it would be specifically desirable to use glyoxylic acid/phosphinic acid a reducing agent with an expectation of accelerated reaction, and The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). This is also the case with Shipley in view of Verbunt, Kondo and Yoshida. (4) The Examiner also notes that all of the examples used ethylenediaminetetraacetate and copper sulfate as the copper source, neither of which are required by the claims, and it has not been shown that the same effects would occur with other bath containing materials.

As a result, a showing of unexpected benefits as to the specific combination of materials as claimed as not been shown, and the rejections above are maintained.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Katherine A. Bareford/  
Primary Examiner, Art Unit 1792